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ABSTRACT

This paper outlines a qualitative research investigation of intranets and their capacity to facilitate organizational knowledge work. The study calls for an alternate view to intranet systems development and evaluation, one that tempers a predominant focus on information content and technology concerns with an awareness of the information needs, uses, and contexts of organizational participants. The objective is to conduct a case study evaluation of intranet usage that examines the information needs and uses of major sets of users and the organizational environment in which the intranet is utilized. Data collection involved a wide variety of techniques, namely interviews, Web usage tracking software, direct observations, and questionnaires. Both content and transaction log analysis serve as primary modes of data analysis. It is hypothesized that by focusing on user information practices and behaviors, intranets may be better utilized as tools to support organizational communication and group collaborative activity. (Contains 33 references.) (Author/AEF)

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Facilitating Knowledge Work with Intranets: An Investigation of the Organizational Information Environment of Intranet Users

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Abstract

This paper outlines a qualitative research investigation of intranets and their capacity to facilitate organizational knowledge work. The study calls for an alternate view to intranet systems development and evaluation, one that tempers a predominant focus on information content and technology concerns with an awareness of the information needs, uses, and contexts of organizational participants. The objective is to conduct a case study evaluation of intranet usage that examines the information needs and uses of major sets of users and the organizational environment in which the intranet is utilized. Data collection involves a wide variety of techniques: namely interviews, web usage tracking software, direct observations, and questionnaires. Both content and transaction log analysis serve as primary modes of data analysis. It is hypothesized that by focusing on user information practices and behaviours, intranets may be better utilized as tools to support organizational communication and group collaborative activity.

Background and Objective

In general, intranets are organizational-wide internets used to promote the gathering, sharing, and dissemination of information throughout the enterprise. Primarily used as a means to access corporate documents, intranets may offer greater potential in their ability to facilitate organizational knowledge work. Here, knowledge work is defined as the acquisition, creation, packaging, application, and reuse of knowledge—activities characterized by variety and exception rather than routine, and performed by professional or technical workers with a high level of skill and expertise (Davenport et al., 1996). More specifically, knowledge work refers to the sharing of insights and best-practices, the generation of new ideas and know-how, and the creation of new products and services.

Activity theory (Engestrom, 1991; Engestrom, 1993; Leont'ev, 1974) may offer a means by which to investigate how intranets support organizational knowledge work. According to activity theory, artifacts shape human experience. By considering "computers as a special kind of tool mediating human interaction with the world" (Kaptelinin, 1996, pg. 49) and knowledge work as an active process of knowing (Blackler, 1995), intranets may be considered as artifacts which mediate knowledge work activity.

Blackler (1993) applies Engestrom's model to organizations and shows how organizations are activity systems in which agents work with colleagues according to routines to produce outcomes; these are mediated through tools & concepts, explicit & implicit rules, and organization & role structures. Figure 1: The intranet as a mediating tool for knowledge work activity is a specific application of Blackler's (1993) organizational activity model and attempts to illustrate how the intranet as a tool can mediate organizational knowledge work outcomes. The diagram highlights two specific points of interest. First, it shows how the intranet as an artifact can shape and influence knowledge work practice. Second, it illustrates how intranet use is situated within a larger social context beyond that of agent and tool—a context comprised of

community, roles and rules.

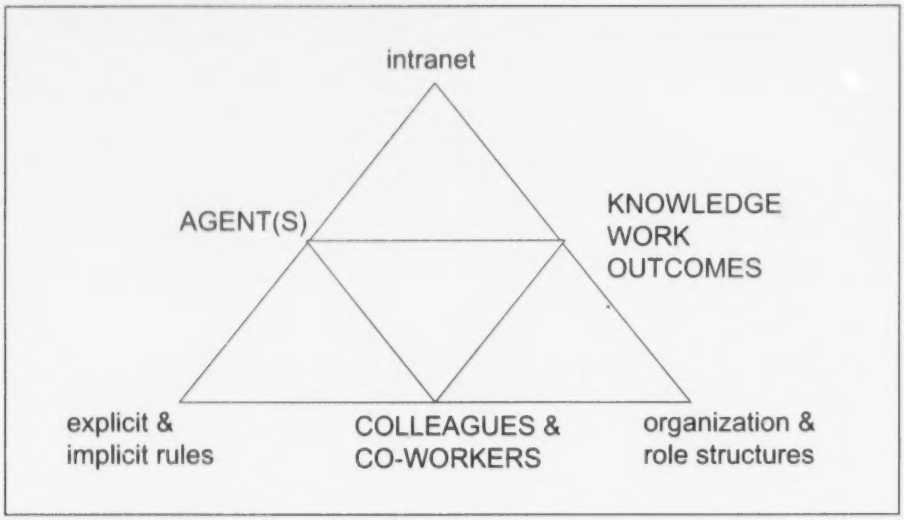

Figure 1: The intranet as a mediating tool for knowledge work activity

To further the development of intranets to facilitate knowledge work, this paper calls the need to investigate the contexts in which organizational participants access, search, collect, create, store, and use information (Detlor, 1997; Detlor, 1998b). An underlying assumption is that information processing is a fundamental component of knowledge work and that by understanding how organizational actors handle and use information in their settings, the design of intranets could help improve the creation and sharing of knowledge (Detlor, 1998a).

Taylor (1986) proposes a user-driven approach to systems development called the value-added model which may offer help in this area. According to Taylor (pg. 3), the "major input to the design of information systems must come from an analysis of the information use environment". Taylor emphasizes the need to describe the environments from which problems arise and which require information for resolution. He suggests that if present system design approaches were tempered by criteria from users and their environments, then systems could be developed that were more responsive to the wide variety of user needs and problems (1982, pg. 341).

Taylor's value-added model is comprised of three basic components: 1) *a formal information system* comprised of specific processes which add value to information messages being processed; 2) *a user or set of users* who, because they sit in particular situations or contexts, have certain problems which establish the criteria for judging the utility of system outputs; and, 3) *an interface or negotiation space* between system and users where the system displays its value-added output to assist users in making choices (pp. 201-202). For a schematic overview of the major components of the model adapted to reflect an intranet focus, refer to Figure 2: Taylor's (1986) value-added approach applied to intranets.

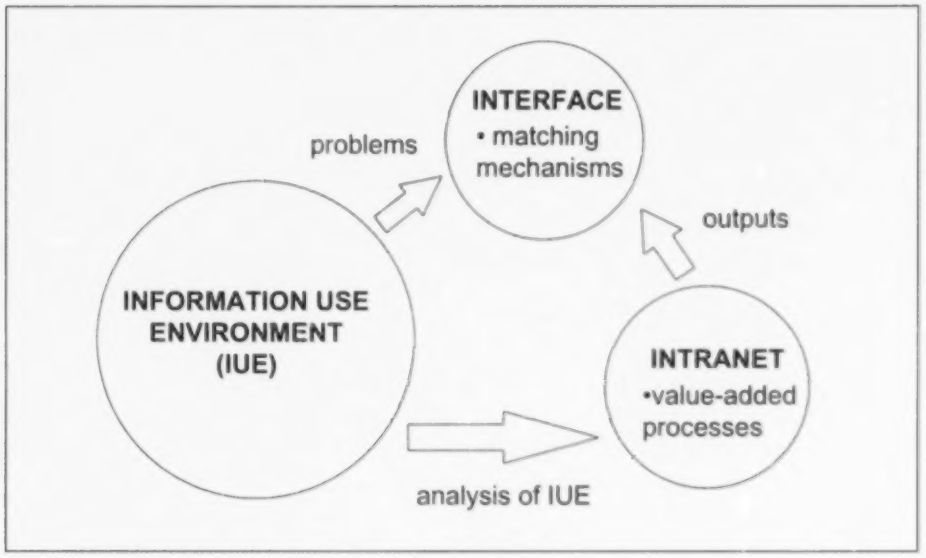

Figure 2: Taylor's (1986) value-added approach applied to intranets

This paper posits that an important benefit may be gained through an analysis of organizational information environments—namely, the development of value-added processes in intranet designs which increase their utility as mediating tools for knowledge work.

Overall, this research has **three goals**:

1. To explore the need for intranets to address the organizational information environment.
2. To examine how intranets may facilitate organizational knowledge work.
3. To investigate the relationship between an intranet's ability to address the organizational information environment and an intranet's capacity to facilitate knowledge work.

This **research is important** for at least three reasons: First, it explores the capacity of intranets to support organizational knowledge work which may lead to recommendations for intranet design which better promote the collaboration and sharing of know-how between organizational actors. Second, it offer insights into the call for a user-centered approach to the design of intranets. Third, it adds to the small body of rigorous research currently available on intranets. A qualitative study emphasizing the relationship between intranets and organizational environments would offer a new and needed perspective.

Research Questions

The study pursues **three research questions:**

1) What is the relationship between intranet usage and the extent to which an intranet matches the organizational information environment?

Here, intranet usage is both a quantitative and qualitative measure. It refers not only to the frequency and information content used on the intranet, but also to the context surrounding this usage. Further, the organizational information environment is understood to comprise three specific areas: 1) *information needs* in terms of the problems typically faced; 2) *information uses* in terms of the ways information is utilized to resolve these problems; and 3) *information context*, which includes not only the characteristics of the physical setting which may impact information access, but also the information culture and attitude of the organization which may influence how information is valued and shared.

Applying Taylor's (1986) value-added approach, it is argued that an intranet would address the information environment if the intranet matched the information needs of organizational participants, the ways in which information was used, and the contexts in which work is situated. It is hypothesized that doing so would lead to more substantial intranet usage.

2) In terms of activity theory (Blackler, 1993; Engestrom, 1991; Engestrom, 1993), how does the intranet as a tool mediate knowledge work activity?

Activity theory is used to provide a conceptual and descriptive framework by which to gain insights on the human activity of knowing and the role intranets play as mediating tools. The purpose is to gain a better understanding of how intranets influence and shape knowledge activity outcomes within organizational contexts.

3) What is the relationship between an intranet's ability to match the organizational information environment and an intranet's capacity to mediate knowledge work?

For this question, an intranet's ability to address the information needs and uses of organizational participants and support the information context in which they work is compared to the extent to which the intranet as a tool is able to mediate knowledge work activity. It is hypothesized that intranets which better address the organizational information environment would be better utilized as mediating tools for knowledge work.

Research Methodology

Central to the research design is the use of multiple data collection & analysis methods. The importance of combining qualitative and quantitative methods as a means of triangulating research results is noted in the IS literature (Benbasat et al., 1987; Kaplan & Duchon, 1988; Lee, 1989; Orlikowski & Baroudi, 1991). In terms of this study, a combination of diverse methods can provide a means of developing a rich and detailed description of how and why people use intranets. For example, Orlikowski (1992; 1993; 1995; 1996) utilized interviews, observations,

and document review in her case studies on the adoption and use of CASE tools and Lotus Notes applications in organizations. The desire to investigate the information environment of intranet users and the capacity of intranets to support knowledge work may lend itself to a similar design.

The main idea behind the intended research is to conduct a case study investigation of major sets of intranet users. As such, the case study site must fulfill certain requirements. First, it must have several distinct sets of intranet users to facilitate the comparison of intranet usage between groups. Second, these groups must not consist solely of novice users, but rather the majority should be comfortable with utilizing intranet technology in day-to-day activities. Third, the intranet should be used to support group collaboration and communication. Last, the organizational culture should be conducive to field research.

In short, this is an exploratory study of intranet usage in organizations. As new insights and themes emerge from an analysis of the data, more data will be collected to support or refute these findings. Figure 3: Schedule of data collection and data analysis depicts a timeline of events that reflects an iterative approach between data collection and analysis.

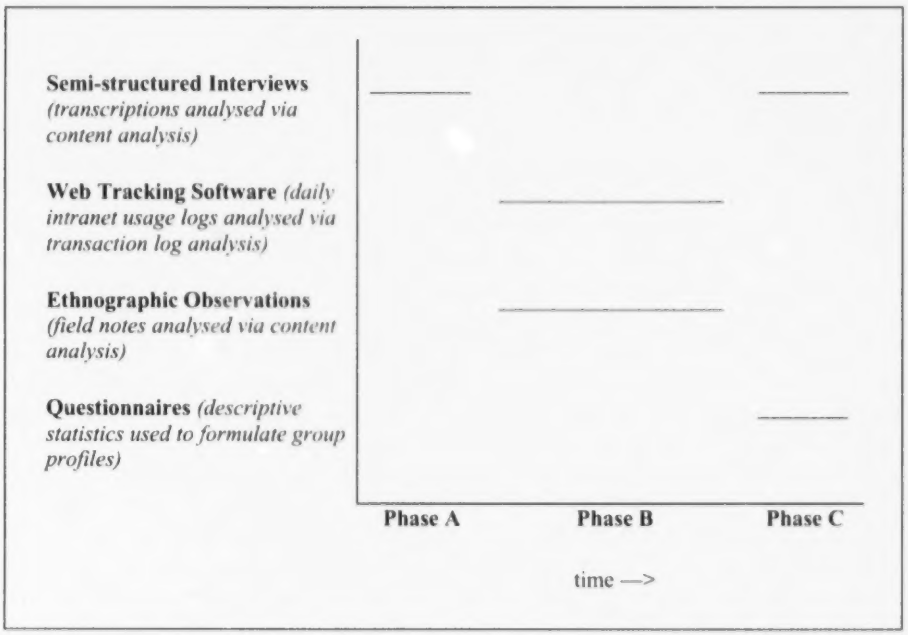
Semi-structured Interviews (transcriptions analysed via content analysis)
Web Tracking Software (daily intranet usage logs analysed via transaction log analysis)
Ethnographic Observations (field notes analysed via content analysis)
Questionnaires (descriptive statistics used to formulate group profiles)
Phase A
Phase B
Phase C
time —>

Figure 3: Schedule of data collection and data analysis

Phase A

The first step of the methodology is to conduct one-on-one, tape-recorded **semi-structured interviews** with organizational participants from each of the different groups of intranet users

being studied. The purpose is to understand the organizational information environment for each of these groups. The interviews will identify the extent to which the intranet addresses the participants' information needs and uses, the degree to which the organizational context affects intranet usage, and how the intranet affects the information culture and attitude of the organization.

After the interviews are transcribed, latent content analysis will be used to gain an interpretive reading of the symbolism underlying the collected data (Berg, 1998, pg. 225). Specific techniques from grounded theory, such as open, axial, and selective coding, will help the researcher arrange, organize, and code data into categories, and explore relationships among these categories to develop descriptions or theories of intranet usage (Strauss & Corbin, 1990; Strauss & Corbin, 1994). This is an iterative process where the researcher constantly moves between coding of the data and the theoretical analysis of the emerging categories (Strauss, 1987, p. 19). However, the analysis will vary from grounded theory in that pre-defined categories based on the theoretical constructs of Blackler (1993) and Taylor (1986) will be used as sensitizing concepts to guide the initial data analysis. As such, content analysis will be both a deductive and inductive process.

Phase B

Two data collection instruments will be used in this phase: web tracking software and ethnographic observations.

The **web tracking software** employed successfully by the researcher in a related study (Choo et al., 1998) will be installed on participants' computers and run transparently whenever a participant's web browser is used during a monitoring period. As the tracking is essentially "invisible", it is not expected to influence the participants' normal intranet usage. The tracking software will record how each participant uses the browser to navigate and manipulate information from the intranet, such as "page back", "page forward", "open URL or file", "reload", "add to bookmarks", "go to bookmarks", "print", and "stop". For each web move, the following information will be recorded: the type of web move; the date and time; the URL; and the web page title. After the monitoring period, the software will be de-installed and the tracking log files collected for analysis.

The logs will provide a timeline of events which can be used to determine the frequency of web usage and the intranet content visited. To analyse this data, the researcher will carry out transaction log analysis, a technique utilized by library and information science researchers to study "electronically recorded interactions between online information retrieval systems and the persons who search for the information found in those systems" (Peters et al., 1993, pg. 38). Transaction log analysis offers a means of observing actual human behaviour; basic measures include the passage of time and the number of commands entered to determine frequency of use and length of typical sessions (Peters, 1993). Significant episodes of activity will be identified through evidence of an event in the tracking logs having consumed a relatively substantial amount of time and effort, or having been a recurrent activity.

Note that the tracking software will provide participants with some degree of privacy and

control. Participants will have the option of turning the tracking off. Also, as the information is recorded to the participants' local hard drives, users will be able to view the data logs themselves to see what information is being captured. In this way, the collected data will be kept confidential and under the control of individual participants.

In terms of **ethnographic observations**, the researcher plans to immerse himself in the work context of each of the groups being studied for a predefined amount of time. Observations will be recorded using field notes. In some instances, observations of intranet use will be tape-recorded if participants are willing to be observed during periods of intranet activity and agree to describe their web moves by "talking out loud".

To analyse this data on field observations, the researcher's notes and tape-recorded observations will be transcribed and content analysis performed.

Phase C

The third phase of this research involves a second-round of interviews as well as the administration of a questionnaire.

The **second-round of interviews** are required to clarify the researcher's field observations and add context to the intranet usage episodes recorded in the tracking logs. The researcher will prompt the participants to discuss these events in sufficient detail so that the researcher can understand the motivating factors why the intranet was used and the degree to which the participants were successful in using the intranet to resolve their problems. The tracking logs will serve as prompts for participants to discuss their typical intranet behaviour.

As with the first set of interviews, the second-round interviews will be transcribed and analysed using content analysis.

A **questionnaire** may be used in the later stages of the research to generate descriptive statistics on user profile characteristics of the various groups being studied. Introducing the questionnaire in the later stages of the project can be beneficial as questions at that time can be localized and asked in a language familiar to the workplace.

Overall, the proposed data collection and analysis techniques will allow for the capture and understanding of a rich and comprehensive set of data. The goal is to obtain insights from this data on how the intranet is currently being used, the ways in which the intranet supports knowledge work activity, and the differences in intranet usage between various groups of users which may be attributed to factors of the organizational information environment.

Research Plan

A large Canadian telecommunications company was approached by the author to serve as a case study site. The company satisfies the requirements outlined above for a study site. It has several distinct sets of intranet users who are adept at using information technology in their daily work practice. Further, the company has indicated a desire to improve its utilization of the intranet as

a tool for knowledge work and has extended an appreciation for field research.

Negotiations are currently underway on the operational aspects of the study. The plan is to conduct a pilot study first on a single group of intranet users. If the data collection and analysis procedures prove to be inappropriate then modifications can be made to the methods used on the other groups.

Expected Contribution

The expected contribution of this research is the provision of a descriptive understanding of intranet usage within the context of the organizational environment. An in-depth analysis of intranets and their capacity to support organizational knowledge work could substantiate or refute the potential of intranets as knowledge management tools and lead to recommendations for future intranet development initiatives which better support knowledge work activity.

Discussion of Challenges

The study raises several problems and concerns which need to be addressed:

1) The methodology will produce rich and varied sets of qualitative and quantitative data for each group of intranet users studied. The central problem is how best to go about comparing and contrasting the data gathered from the various data collection techniques to answer the study's research questions? What other studies may serve as a reference for integrating data collected from various methods?

For example, the content analysis of the transcribed interviews and field notes will produce qualitative outputs, namely descriptive models of intranet usage at the group and organizational levels. Conversely, the transaction log analysis and use of questionnaires will produce quantitative results. How should the researcher go about synthesizing such outputs together? What techniques can be used to identify relationships and patterns across qualitative and quantitative outputs? Should the researcher refrain from such cross analysis? Would it better to keep the analysis of qualitative and quantitative outputs separate and pull them together via a concluding descriptive discussion?

2) The combination of qualitative and quantitative methods resurrects the debate on the appropriateness of combining different philosophical assumptions in a single research design (Lee, 1991; Walsham, 1995). How appropriate is it to combine opposing epistemological and ontological positions in a single design? What are the dangers in carrying out such a study? What steps should the author take to defend such a position?

3) Should reliability testing be done on the content analysis portions of the study? According to Krippendorf (1980), two or more coders should independently describe a possibly large set of data in terms of a common code book to determine the reliability of a content analysis. Here, reliability is expressed as a function of the agreement achieved among coders regarding the assignment of data units to categories. The need to conduct such reliability testing assumes a positivist stance towards the data in that it is assumed to be independent of the method or person

by which it was obtained. However, if one adopts an interpretive perspective, the bias and subjective interpretations of the researcher are made explicit in the development of coding categories. As such, the need to perform reliability testing of a content analysis is diminished. How should the reliability testing of the content analysis portions of the study be handled?

4) A good starting point for a preliminary set of interview questions for Phase A is by Rosenbaum (1996). In his empirical investigation of the information use environment and information behaviours of managers in a public sector organization, Rosenbaum asked questions which elicited background information on organizational participant job functions, the problems faced during a typical week, the types of information used, and the ways in which information was typically sought, gathered, evaluated, and utilized. For the proposed study, these questions must be appended with others which probe the context in which work is done and explore how the intranet mediates information seeking and gathering behaviour. What other studies may serve as a reference for such questions?

5) The transaction logs contain a rich account of unobtrusive intranet usage. Though the frequency and duration of intranet episodes will be obtained from the logs, what other types of information should be derived from this data? Examples of the use of transaction log analysis in the library and information science field include studies of typical chains of command (i.e. web moves) and state-to-state transitions; errors, zero-hits, missed opportunities, failures and their causes; use of online help; analyses of specific search states; the use of advanced search features; printing and downloading behaviour; user persistence; and quitting behaviour (Peters et al., 1993). Should any of these (or others) be derived from the logs to help answer the study's research questions?

6) For the second-round of interviews in Phase C, several different techniques can be used to elicit comments from participants on their intranet usage. One is the critical incident method (Flanagan, 1954) where participants are asked to discuss one or two critical incidents of intranet seeking and use which led them to some significant action or decision. Another is Dervin's (1992) micro-movement time-line approach which asks users to specify in a step-by-step manner what happened in their intranet usage situations. In this approach, the participants are asked to write down brief descriptions of their perceptions of their intranet usage at static points in time. For each of these events, participants are asked to recall the questions they had and what they needed to know or understand at that time to help them make sense of the situation. Are these techniques satisfactory? Which is preferable? Are there other techniques available which may better probe the surrounding context of intranet usage identified in the tracking logs and field observations?

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